

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 10/675,557  
Filing Date: September 30, 2003  
Applicant: Terry L. Schneider  
Group Art Unit: 1794  
Examiner: Brett Alan Crouse  
Title: POLYMER COMPOSITE STRUCTURE REINFORCED  
WITH SHAPE MEMORY ALLOY AND METHOD OF  
MANUFACTURING SAME  
Attorney Docket: 7784-000553/US/CPC

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Mail Stop AF  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

**LETTER**

Dear Sirs:

Pursuant to our telephone conversation with Examiner Brett A. Crouse regarding the "Notice of Panel Decision from Pre-Appeal Brief Review" mailed September 17, 2008, advising that a conference would not be held because Applicant concurrently filed a Terminal Disclaimer with the Pre-Appeal Brief Request for Review, it is the undersigned's understanding that the Terminal Disclaimer has in fact been entered. Pursuant to the recommendation of Examiner Crouse, the Applicant is resubmitting the Pre-Appeal Brief Request for Review along with the Pre-Appeal Statement for the Panel's review and

consideration. A copy of the Pre-Appeal Brief Request for Review and Pre-Appeal Statement previously filed on August 27, 2008 are attached hereto for consideration.

Applicant believes that no fee is required with this filing. If, however, the Office believes that a fee is required, please charge our deposit account 08-0750 for any fee that may be due.

Please contact the undersigned if there are any questions regarding this matter.

Respectfully submitted,

Dated: Oct. 3, 2008

By:   
Mark D. Elchuk, Reg. No. 33,686

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**PRE-APPEAL BRIEF REQUEST FOR REVIEW**Docket Number (Optional)  
7784-000553/US/CPC

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

Application Number  
10/675,557Filed  
September 30, 2003First Named Inventor  
Terry L. SchneiderOn Not ApplicableArt Unit  
1794Examiner  
Brett Alan Crouse

Signature \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).

Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor



Signature

☐ assignee of record of the entire interest.  
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☒ attorney or agent of record.  
Registration number 33,686.

☐ attorney or agent acting under 37 CFR 1.34.  
Registration number if acting under 37 CFR 1.34 \_\_\_\_\_

Mark D. Elchuk

Typed or printed name

(248) 641-1600

Telephone number



Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below\*.

☐ \*Total of \_\_\_\_\_ forms are submitted.

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**PRE-APPEAL STATEMENT**

Sir:

The present Pre-Appeal statement is being submitted in response to the final rejection of all of the pending claims in the Final Office Action dated May 28, 2008. Reconsideration and reversal of these rejections is respectfully requested.

**Subject Matter**

The present application involves a polymer composite structure having an interlayer which is reinforced with shape memory alloy (SMA) particles. The use of SMA particles in the interlayer significantly enhances the damage resistance and damage tolerance (e.g. compression-after-impact (CAI) strength) of the interlayer without negatively affecting its hot-wet compression strength. In one form the polymer composite structure comprises titanium-nickel alloy particles, and more preferably

particles formed from NITINOL® alloy. The titanium-nickel alloy particles have superelastic, reversible strain properties similar to elastomeric or polymeric thermoplastic particles more traditionally utilized in the interlayer of a polymer composite structure, but do not negatively affect the hot-wet compression strength of the interlayer. The result is a polymer composite material having an interlayer which even more effectively absorbs impact stresses, thereby toughening the composite material, without negatively affecting its hot-wet compression strength.

#### **Rejection under 35 U.S.C. § 102(b)**

Claims 1, 2, 5, 6, 9 and 11 remain rejected as being anticipated by Terasaka (U.S. 5,770,305). Claim 1 has been amended to positively recite the “**stress induced phase change property**” of the SMA particles that provides the compression-after-impact strength to the adhesive compound, adhesive film or adhesive paste being claimed. Claim 1 has also been amended to specifically recite that the SMA particles **are provided in an austenitic phase**.

The Examiner is ignoring an important point about the Terasaka et al. reference, that being that the functionality of the resin in Terasaka et al. would be destroyed if the SMA particles were presented in their austenitic phase during manufacture of the resin in Terasaka et al. Terasaka et al. requires the particles 44 to be in their martensitic state to enable them to be “crushed” or deformed initially in the fabrication process so that they can perform their needed function. The particles 44 in the Terasaka et al. resin absolutely need to be able to expand in response to a thermal change in the resin. The particles 44 also need to be able to return to a spherical shape via the “shape memory effect” (temperature-induced martensite to austenite phase transformation). Put differently, when the resin in which the particles are encapsulated expands due to a change in humidity and/or temperature, which causes the connection terminals to be pushed upwardly in the drawing of Figure 4, the particles need to be able to “decompress”. By having the particles compressed into their martensitic state, this allows the particles 44 to expand in the thickness direction of the ACF, thus maintaining electrical conductivity between the connection terminals (col. 3, lines 5-19 of Terasaka et al.). Thus, if the particles were in their austenitic phase while suspended in the resin,

this would provide no benefit to the resin in Terasaka et al., and furthermore would actually render the particles in the resin inoperable for their intended purpose. This is fundamentally different from the construction of the presently claimed adhesive compound, adhesive film and adhesive paste. Nothing in Terasaka et al. discloses or even suggests using the stress induced phase change property of the SMA particles, together with the particles in their austenitic state, to enable the SMA particles to function to actually absorb impacts and thus enhance the compression-after-impact strength of the adhesive compound, adhesive film or adhesive paste being claimed.

The Examiner has cited various paragraphs in Terasaka et al., principally in column 2, lines 65-67 and column 3, lines 1-10, to support an assertion that "stress induced" deformation is taught by Terasaka et al. However, this text merely underscores the fundamental difference between the presently claimed subject matter and that of Terasaka et al.: that the SMA particles are initially crushed by thermocompression, and therefore would not be able to provide any meaningful impact resistance to the resin in which they are suspended. This text further states that the SMA particles "remain in a compressed state due to stress acting thereon from the outside, and only revert to their initial state due to a stress acting thereon from the outside" (that stress being a temperature related stress acting on the resin). The Examiner appears to find that since this text in Terasaka et al. mentions that the SMA particles can be crushed (i.e., physically forced to undergo an austenite to martensite phase transformation), that Terasaka et al. is basically functioning in the same way as the compounds and adhesives set forth in the independent claims of the present application. But this could not be further from the truth. The Terasaka et al. resin could not function to provide any appreciable compression-after-impact strength because of how the SMA particles are held in their compressed states. There is further not even the slightest suggestion in Terasaka et al. of using the stress induced phase change property of SMA particles for the purpose of enhancing compression-after-impact strength to the resin in Terasaka et al.

For at least the above set forth reasons, the undersigned continues to maintain that Terasaka et al. does not make use of a stress induced phase change of the SMA particles to enhance a compression-after-impact strength of the underlying film or

compound. In view of the amendments to independent claims 1, 14 and 22, and the foregoing remarks, it is respectfully requested that the rejection in view of Terasaka et al. be withdrawn.

#### **Rejection Under 35 U.S.C. §103(a)**

Claims 1, 2, 5-15, 18-24 and 27-29 were finally and improperly rejected as being obvious over Terasaka et al. in view of Herkules and Yliopisto. While Herkules and Yliopisto may discuss the various properties of shape memory alloys, neither provides any suggestion or motivation to combine their teachings with the system of Terasaka et al. to produce the claimed subject matter. In fact, using SMA particles in their austenitic phase would destroy the functionality and utility of the resin in Terasaka et al. This is because the particles in Terasaka et al. need to be able to expand in response to temperature increase (i.e. the "shape memory effect" which is only possible if the SMA particle starts in its martensitic phase).

The fundamentally important point which the Examiner has overlooked is that there is no suggestion from the Herkules or Yliopisto references, nor from the Terasaka et al. reference, to use SMA particles in their austenitic phase to improve the compression-after-impact strength of the resin in Terasaka et al. Terasaka et al. simply is not concerned whatsoever with improving compression-after-impact strength, and in fact to use the use SMA particles in their austenitic phase in the resin of Terasaka et al. would basically destroy the ability of the resin to function for its intended purpose. Accordingly, it is submitted that this obviousness rejection is improper and should be reversed.

Claims 1, 2, 5-15, 18-24 and 27-29 were erroneously rejected as being obvious over Yamakawa et al. (WO/03/102071; hereinafter "Yamakawa et al."). Yamakawa et al. is directed to a semiconductor that is manufactured in part with the use of a thermoconductive curable liquid polymer composition 5. The composition 5 is stated to function as a protective layer for the semiconductor element and as an adhesive agent for heat dissipation fins 6. The polymer 5 is stated to include a filler "B" made from a thermally elongatable shape memory alloy and a thermoconductive filler "C". The principal feature and function of the polymer is that it forms a good thermoconductive,

curable liquid polymer with good flowability before curing, and good electrical conductivity after curing. Beyond a brief statement that the polymer 5 functions as a protective coating (which virtually any polymer coating would), there is no mention or suggestion that the polymer is able to provide any appreciable compression-after-impact strength, nor is being used for this purpose. Rather, it appears that just like with Terasaka et al., the SMA material in Yamakawa et al. is being used strictly to respond to temperature changes that the resin experiences and, in response to such temperature changes, to change shape to help maintain electrical conductivity between components that are covered by the resin. Thus, this reference, like Terasaka et al., appears to only make use of the thermal phase change property of the SMA particles. For at least this reason, reconsideration and withdrawal of this obviousness rejection is also respectfully requested.

#### **Provisional Double Patenting Rejection**

A terminal disclaimer is being submitted concurrently with the present "Pre-Appeal Statement" to remove the ground for rejection under paragraph 7 of the Final Office Action.

#### **CONCLUSION**

It is believed that all of the stated art rejections are improper and withdrawal of all of the outstanding rejections is respectfully requested.

Respectfully submitted,

Dated: Aug. 27, 2008

By: Mark D. Elchuk  
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